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09/826,078	04/05/2001	Christy Mei-Chu Woo	52352-767	3860

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[REDACTED] EXAMINER

DEO, DUY VU NGUYEN

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1765

DATE MAILED: 07/29/2003

11

Please find below and/or attached an Office communication concerning this application or proceeding.

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**BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES**

Paper No. 11

Application Number: 09/826,078

Filing Date: April 05, 2001

Appellant(s): WOO ET AL.

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Edward J. Wise  
For Appellant

**EXAMINER'S ANSWER**

This is in response to the appeal brief filed 6/10/03.

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**(1) Real Party in Interest**

A statement identifying the real party in interest is contained in the brief.

**(2) Related Appeals and Interferences**

The brief does not contain a statement identifying the related appeals and interferences which will directly affect or be directly affected by or have a bearing on the decision in the pending appeal is contained in the brief. Therefore, it is presumed that there are none. The Board, however, may exercise its discretion to require an explicit statement as to the existence of any related appeals and interferences.

**(3) Status of Claims**

The statement of the status of the claims contained in the brief is correct.

**(4) Status of Amendments After Final**

No amendment after final has been filed.

**(5) Summary of Invention**

The summary of invention contained in the brief is correct.

**(6) Issues**

The appellant's statement of the issues in the brief is correct.

**(7) Grouping of Claims**

The rejection of claims s 4, 5, 7, 8, 10-15 stand or fall together because appellant's brief does not include a statement that this grouping of claims does not stand or fall together and reasons in support thereof. See 37 CFR 1.192(c)(7).

**(8) ClaimsAppealed**

The copy of the appealed claims contained in the Appendix to the brief is correct.

(9) *Prior Art of Record*

6,225,202 Gupta et al. 5-2001

Wolff et al., Silicon Processing for the VLSI Era, vol. 1, pages 361, 367, (1986).

Admitted prior art, pages 2 of the specification.

## **(10) *Grounds of Rejection***

The following ground(s) of rejection are applicable to the appealed claims:

## ***Claim Rejections - 35 USC § 103***

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 4, 5, 7, 8, 10, 13, 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gupta et al. (US 6,225,202), admitted prior art, and Wolf et al. (Silicon Processing for the VLSI Era).

Gupta describes a method for forming nickel silicide comprising: introducing the substrate to a deposition chamber; depositing a nickel layer on the silicon surface by sputtering; Unlike claimed invention Gupta doesn't describe heating the chamber before introducing the substrate. Page 2 teaches that it is well known to preheat the chamber, including sputtering chamber, to accelerate the removal of contaminates from the chamber, including water vapor and other gases from the chamber components.

Unlike claimed invention Gupta doesn't describe heating the chamber throughout the deposition process. However, it would be obvious to one skilled in the art heat the chamber during deposition in order to keep process temperature constant for the deposition. Also Wolf describes the conventional process of sputtering including preheating substrate before deposition heating substrate during the deposition. It would have been obvious for one skilled in the art to deposit nickel also in light of Wolf because he teaches that heating substrate during deposition improves film properties such as step coverage (page 361, 367).

Even though Gupta doesn't describe the process for a second wafer. However, it would be obvious to one skilled in the art that there are more than one wafers being processed at a time. Since it is desired to preheat the wafer before deposition as taught by Wolf for a sputtering process it would be obvious to keep the chamber heated in order to heat the second coming wafer and remain the continuity of the whole process. This would save processing time of reheating the chamber and it would increases product yield.

Referring to claims 4 and 10, Wolf also describes cleaning the substrate before depositing the nickel layer and heating substrate or chamber using lamps, backside heating and other technique (pages 361, 367).

Referring to claim 5, it would have been obvious to one skilled in the art that the power of the lamp would during the introduction of the substrate and during the deposition process would be depended on the desired T of the process and it would have been determined through test runs in order to obtain the optimum power of the lamp to provide the T for the deposition of nickel with a reasonable expectation of success.

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Referring to claim 7, Gupta also describes heating the nickel layer to form nickel silicide by RTA on the gate electrode and source/drain regions; removing unreacted nickel from the substrate (col. 2-col. 3, line 35).

Referring to claims 13, 14, Gupta describes removing the unreacted nickel metal using wet etching, such as ammonium hydroxide, hydrogen peroxide, and water, are well known and practiced by one skilled in the art (col. 1, line 20-26).

3. Claims 11, 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gupta, admitted prior art and Wolf as applied to claim 8 above, and further in view of Chen et al. (Comparison of TiSi<sub>2</sub>, CoSi<sub>2</sub>, and NiSi for thin-film Silicon-on-Insulator Applications).

Referring to claims 11 and 12, the RTA to form nickel silicide at 550 degrees Celsius and 40s has been known to one skill in the art as taught by Chen (page 2440). And the amount of time for the RTA would have been determined through test run in order to achieve the optimum time for the complete forming of nickel silicide.

4. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Gupta and Wolf as applied to claim 14 above, and further in view of Kunishima et al. (US 5,162,263).

Gupta further describes continuing processing the integrated circuit as is conventional after removal of unreacted metal. According to Kunishima shows that a conductive connection to the nickel silicide is formed without having a cap layer (col. 6, line 26-33).

#### **(11) *Response to Argument***

Referring to applicant's argument that Wolf teaching of preheating the wafer doesn't suggest that the deposition chamber is continuously heated between the removal of the first substrate and the introduction of the second substrate, first of all, it doesn't make any sense for

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one skill in the art to preheat the substrate and then introduces it into a cool chamber where the substrate would be cooling down. Furthermore, as Wolf teaches in page 361 "**such step coverage heating may be done in the sputter chamber during deposition,**" therefore, it would be obvious for any skill in the art to keep the chamber heated between the removal of the first substrate and the introduction of the second substrate (there are always more than one wafers being processed at a time: page 2, line 11-15) so that the second substrate doesn't loose its T or have to be heated again in which time will be wasted and slow down the process and reducing the product yield. Second of all, it would be a common sense for any skill in the art to keep the chamber heated in order to remain the continuity of the whole process because by cooling the chamber down and then heat it up again would wastes time. On the other hand, by keeping the chamber heated would save processing time from reheating the chamber and it would increases product yield.

Applicant's argument that "it would reasonably be presumed that heating of the chamber ceases when the processing of a wafer complete and the wafer is to be exited from the chamber, and that the heating of the chamber remains off until a new wafer enters whereupon, the chamber is closed and heating, including preheating, begins anew" is assumptive and without support of evidence.

In response to applicant's argument that the examiner's conclusion of obviousness is based upon improper hindsight reasoning, it must be recognized that any judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight reasoning. But so long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the

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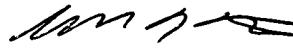
applicant's disclosure, such a reconstruction is proper. See *In re McLaughlin*, 443 F.2d 1392, 170 USPQ 209 (CCPA 1971).

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

DVD  
July 25, 2003

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